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Business case for night deliveries in the city of São Paulo during the 2014 World Cup

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Abstract

Events that mobilize large crowds, such as the 2014 FIFA World Cup, present challenging obstacles to operations attempting to deliver goods efficiently in major urban centers. This study presents a logistics business case that implemented a pilot project during the 2014 FIFA World Cup in Brazil, which shifted delivery times to off-hour deliveries (10:00 p.m. to 6:00 a.m.). The pilot project was implemented to identify the constraints and opportunities related to off-hour deliveries in São Paulo, Brazil. Additionally, the project was able to address the congestion and delays experienced during daytime deliveries. The study relied on a partnership forged among a logistics company, a sportswear company, and an academic center, and there was no government support for this case study or project.

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Keywords: off-hour deliveries, FIFA World Cup, freight demand management

1. Introduction

Due to the high product demand and consumption of urban populations in Brazil, freight vehicles are the transport method of choice, making urban cargo transport fundamental to sustaining residents' lifestyles, permitting commercial and industrial activities, and generating taxes and employment in urban centers (Allen *et al.*, 2002).

To manage the use of public roadways and reduce the impact from the movement of large numbers of vehicles at peak hours, local governments often institute ordinances that hamper the movement of small and large vehicles. Restrictions affecting cargo delivery activities in the municipality of São Paulo limit circulation, loading and unloading of goods in certain regions and at certain times, a de facto truck ban. The main restricted area is

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designated as a Maximum Vehicle Restriction Zone (ZMRC, Zona de Máxima Restrição de Veículos), comprising approximately 100 km2 (Brasil, 2012; Prefeitura de São Paulo, 2012a,c; São Paulo, 2007; 2008; 2004). Additionally, large-scale traffic generating centers (shopping malls and retail superstores, for example) are only allowed to receive goods from large delivery vehicles at night (São Paulo, 2007).

However, smaller trucks are allowed to operate inside the ZMRC during the daytime. Thus, companies still make deliveries during regular hours using urban cargo vehicles (UCVs) – which have smaller load capacities and vehicle weights – instead of transferring deliveries to off-hours. These UCVs have a maximum width of 2.20 m, a maximum length of 6.30 m, and limitations on air pollutant emissions (São Paulo, 2007).

Large-scale public events further complicate freight operations during normally congested daytime hours. For example, the 2014 FIFA World Cup occurred in Brazil from June 12, 2014 to July 12, 2014, and São Paulo was one of the main host cities. Six games took place on June l, 19, 23, and 26 and July 1 and 7, 2014 in the Itaquerão stadium located 16 kilometers from downtown São Paulo. Within the city, five locations were allocated for public exhibitions of all the World Cup games. The largest of these events was managed by FIFA, the FIFA FAN FEST, which was located in Vale do Anhangabaú in downtown São Paulo, well within the ZMRC. Several musical performances also took place at the FIFA FAN FEST, with sizable attendance. Fan Fests happened almost every day during the World Cup, as all World Cup games were projected on large screens, as presented in the description of the case section in Fig. 2.

The business case developed a pilot project for a sportswear company by its logistics provider – DHL Supply Chain – in partnership with the Center for Logistics Systems Innovation – CISLOG – at University of São Paulo. The idea was to create a contingency plan for the World Cup and analyze the operational possibility of transforming the project into a longer-term strategy for both companies. The objectives were to surmount obstacles caused by daytime urban transport activity and to benefit local communities by reducing traffic and environmental pollution. This project was conducted on June 3rd in two stores: the first located 300 meters from the FIFA FAN FEST location, inside a downtown shopping mall, and the second located 16 kilometers from downtown, inside another shopping mall. These stores were chosen to participate in the pilot project because of their proximity to FIFA FAN FEST events and their location within the area of circulation and load/unload restrictions (i.e., within the ZMRC). The additional São Paulo shopping mall was chosen also because of its proximity to FIFA FAN FEST, where additional vehicle restrictions were imposed by the São Paulo traffic authority.

2. Materials and methods

This project can be characterized as an exploratory, descriptive, and qualitative case study. The first stage of this study, after defining the initial problem, involved mapping the process of urban distribution to identify the difficulties of daytime delivery. A spreadsheet was created during the second stage to monitor and collect data about the times of operation and other aspects that influence this activity. During the third stage, deliveries were directly monitored, drivers and customers were interviewed, and data were collected. During the final stage, the operational and financial results of the pilot project were analyzed. These results included both positive and negative aspects as well as points to be observed in conducting this type of operation.

3. Literature review

Supply chain structure and vehicle utilization strongly influence environmental performance within the road freight transport sector (McKinnon, 2003). Thus, the delivery planning process should focus on distribution efficiency and make the best use of city infrastructure to reduce the impacts, such as traffic congestion, greenhouse gas emissions, noise, accidents and health problems (McKinnon, 2003). In general, the main restrictions on transporting cargo in urban areas are related to environmental zones, delivery time windows, vehicle weight and size limitations, schedule restrictions in circulation and loading/unloading areas, and urban tolls (Lindholm, 2013).

According to Leonardi and Baumgartner (2004), operational efficiency can be classified into different categories: (1) logistics efficiency, by increasing the load factor, choosing the optimum vehicle category and optimizing the entire transportation chain from origins to final delivery; (2) vehicle efficiency, through reduction in fuel consumption via vehicle design and technology, such as motor oils and low resistance tires; (3) driver efficiency,

through training or assistance from on-board units measuring components of driving behavior that influence fuel use; and (4) route efficiency, by using information from the itinerary, road conditions or traffic to optimize routing.

According to Thompson and Taniguchi (2001), there are four key stakeholders involved in urban freight transport: (1) shippers; (2) freight carriers; (3) residents; and (4) administrators/governments. Each stakeholder has its own objectives, and there is an important interrelation among them (Tseng, *et al.*, 2005). Holguin-Veras *et al.* (2005) note that receivers are also a main stakeholders group that must be engaged during off-hour planning. For instance, a low efficiency carrier, vehicle or logistics process could impact shipper sales or production timetables – reducing consumer satisfaction and increasing costs. However, inefficient or restrictive management can interfere with carrier efficiency and costs.

In a survey conducted by Holguin-Veras *et al.* (2005) the receivers identified speed of delivery, shorter delivery times, and reduced costs as reasons for using off-hour deliveries. Obstacles to night deliveries include the need to open stores, increased labor costs, and complaints from the local population. It should be noted that increases in costs are reflected in direct or indirect increases in product prices for the final consumer.

According to Holguin-Veras *et al.* (2012), there are two main off-hour delivery classifications: (1) staffed, which requires personnel for receiving, verifying the shipment for loss or damage, and signing off on the delivery receipt; and (2) unassisted, which requires a specific structure, area or technology to create a receiving mechanism. In staffed delivery operations, personnel ensure delivery and property integrity but represents incremental labor costs. In unassisted delivery, receiving mechanism cost must be compensated and risks must be addressed.

Off-hour deliveries benefit all stakeholders. Receivers enjoy superior reliability, lower delivery costs and reduced inventory because of logistics efficiency while shippers and carriers benefit from improved asset utilization and reduction in parking fines (Holguín-Veras *et al.*, 2012). According to these authors, local communities benefit from increased quality of life due to reductions in daytime truck traffic and environmental pollution. The carriers benefit from improved logistics, vehicle and route efficiency because there are no inbound hours limitations on the receivers and no scheduling of trucks operations during the night.

In an off-hour delivery scenario, the tradeoff between receiver and shipper benefits is unbalanced: during regular hours, receivers do not face incremental costs, but carriers must content with longer times spent in traffic. During off-hours, the shippers and carriers benefit from faster travel times and increased productivity, but there are additional costs for receivers (Holguin-Veras and Polimeni, 2006).

To adopt an off-hour delivery schedule, it is mandatory for most receivers that the incremental costs are recouped and that the unassisted receiving mechanism costs are covered by the shipper or carrier. For this latter issue, security concerns must be addressed by the shipper and carrier because the receiver will not be present to sign off on the delivery receipt (Holguin-Veras *et al.*, 2012; Holguín-Veras *et al.*, 2013). Therefore, if there are no public incentives, the receiver is the most influential decision-maker of the delivery stakeholders.

According to Silva (2011), there have been discussions about public incentives for night deliveries in São Paulo since 1996, when the government began to engage the transport and service sectors on this problem. A survey conducted by the São Paulo traffic authority (CET – Companhia de Engenharia de Tráfego) with the local community and commercial sector identified the following advantages for shippers, carriers, receivers and community members: (1) improved public mobility and reduced time spent in traffic; (2) faster travel speed and greater operational efficiency, reducing the fleet size required; (3) greater freedom of movement and parking; (4) reduction of parking fines; (5) better delivery planning and optimization; (6) less interference of receiving in customer service activities; (7) lower freight cost; (8) reduced driver stress and absenteeism due to more comfortable temperature and reduced traffic; and (9) reduced environmental impact because of lower fuel consumption and pollution.

4. Description of the case

Currently in São Paulo, restrictions on cargo vehicle circulation limit within ZMRC apply Monday through Friday from 5:00 a.m. to 9:00 p.m. and Saturdays from 10:00 a.m. to 2:00 p.m. (São Paulo, 2008).

These restrictions also affect restricted structural roadways (VER, Vias Estruturais Restritas), which are important and high traffic volume routes that connect the city during the day (Prefeitura de São Paulo, 2012c). Loading and unloading operations at large-scale traffic generating centers (PGTGP, Pólos Geradores de Tráfego de Grande Porte),

such as supermarkets, superstores, shopping malls, warehouses and wholesale terminals, hospitals, car dealerships, and gas stations are restricted to off-hours (from 10:00 p.m. to 6:00 a.m. Monday through Friday and 2:00 p.m. to 6:00 a.m. on Saturdays) (São Paulo, 2007). Deliveries using smaller vehicles (UCVs, urban cargo vehicles) are permitted as exceptions as long as these vehicles are duly registered and authorized by the city's traffic authority (São Paulo, 2007).

This business case explored the sportswear industry and impact on deliveries during the day in the city of São Paulo. The warehouse is located in the city of Louveira, 70 km from São Paulo. The DHL Supply Chain cross-docking hub is located in the city of Barueri, 30 km from the center of São Paulo. After the products are transferred from the warehouse to the hub in large vehicles, they are loaded onto several smaller outbound trucks (UCVs) and combined with products from different origins.

At the hub, loads are sorted by the recipient's region and receiving schedules. Merchandise from various suppliers is received at the hub in the afternoon, processed overnight, and dispatched in the morning on the following day, starting at 6:00 a.m. The hub delivers divided cargoes of goods to customers located in the São Paulo metropolitan area.

To conduct this project, some of these deliveries were tracked to identify key characteristics of daytime delivery operations in the urban center of São Paulo. During this monitoring, it was observed that delivery locations were mainly in commercial centers such as shopping malls or on the street and that some stores lacked nearby parking and unloading infrastructures. The places available for parking ranged from private parking lots and exclusive loading and unloading areas to non-exclusive spots on the street (Fig. 1a). During the daytime monitoring period, difficulties were observed in finding open parking spots, which forced drivers to park blocks away before unloading and to walk long distances to the store with goods in hand – a situation that increases both driver effort and the risk of theft.

The periods when merchandise was being unloaded and moved from the vehicle to the store were identified as the times when goods were most susceptible to theft because the vehicle is left unattended and loaded with goods from different shippers in unsafe locations. In commercial centers with off-street parking and loading docks, the risks are higher if goods are left unattended in hand trucks in the service area while the driver carries other goods to the stores for delivery.

In commercial locations, appropriate places, such as parking lots or internal docks, are not always available for unloading. At commercial centers that allow access to loading docks in the internal parking area, there are often lines (Fig. 1b) in which vehicles must wait for access, and advance registration of the driver and vehicle may be requested. Deliveries using hand trucks are permitted during hours determined by the mall administration (Fig. 1c), usually limited to times when there are fewer shoppers present thus restricting the receiving window for stores and creating lines at freight elevators. Where hand trucks are not permitted, the merchandise is carried in as many trips as necessary between the vehicle and the store. These factors negatively impact operation productivity, increasing delivery times and affecting the ability to comply with receiving windows and scheduled deliveries. Another difficulty identified was the lack of infrastructure for receiving goods, such as deliveries using hand trucks needing to use stairs (Fig. 1d).

At the time of delivery, the receiver must examine packages for loss or damage and sign off on the delivery receipt to accept the shipment. If there is evidence of loss or damage, the receiver must note it on the delivery receipt; this will be used as evidence to support any claim. In some cases, the receiver opens the packages and checks the products for damage (Fig. 1e). Different methods of inspecting deliveries result in variable delivery times.

Variability in the time of delivery and delayed deliveries are receiver’s most common complaints (given the unpredictability of traffic conditions). These factors disturb staff activities and interrupt customer service. For the carrier, this may delay subsequent deliveries, as there is a chance that staff will not be available for receiving when the carrier arrives.

Access entries to deliver goods can be the same entries used by store customers, and delivery delays may disturb shopper service.

All the factors mentioned above contribute to increased delivery times, but the time spent in traffic is one of most significant factors affecting daytime deliveries. All monitored routes faced intense traffic during the day (Fig. 1f).

Cargo theft is another problem that affects logistics costs and efficiency; it demands security constraints, such as armed escorts, GPS tracking and load factor limitations. In 2014, 8,510 cargo thefts were reported in the State of São

Paulo, an increase of 6.92% form 2013 (SSP/ SP, 2014). Of the total of thefts, 82.45% were concentrated in the São Paulo Metropolitan Area.

Fig. 1. Daytime delivery restrictions

4.1. Pilot project during the 2014 FIFA World Cup

This pilot project for night deliveries in the city of São Paulo involved DHL Supply Chain and a sportswear company with large movements of packages in São Paulo but no city government participation. The idea was to create a contingency plan for the World Cup and analyze the possibility to transform the project into a long-term strategy. The project objective was to reduce the impact on all stakeholders caused by daytime urban challenges and to benefit the local community by reducing traffic and environmental pollution. For the pilot project, the sportswear company selected two outlet stores located in different shopping malls (São Paulo and São Bernardo do Campo). Both retail stores are operated and managed by the company, which facilitated implementation of the pilot project. Outlet stores usually sell a large volume of sale products and have little storage space. Deliveries to the selected outlets take place three times a week, with average volumes of 10 m³ for the São Paulo shopping mall and 14 m³ for the São Bernardo do Campo shopping mall. The company has 4 additional outlets located in São Paulo that were not selected for the pilot. The stores process an average of 166 m3 of goods and 14 deliveries per week.

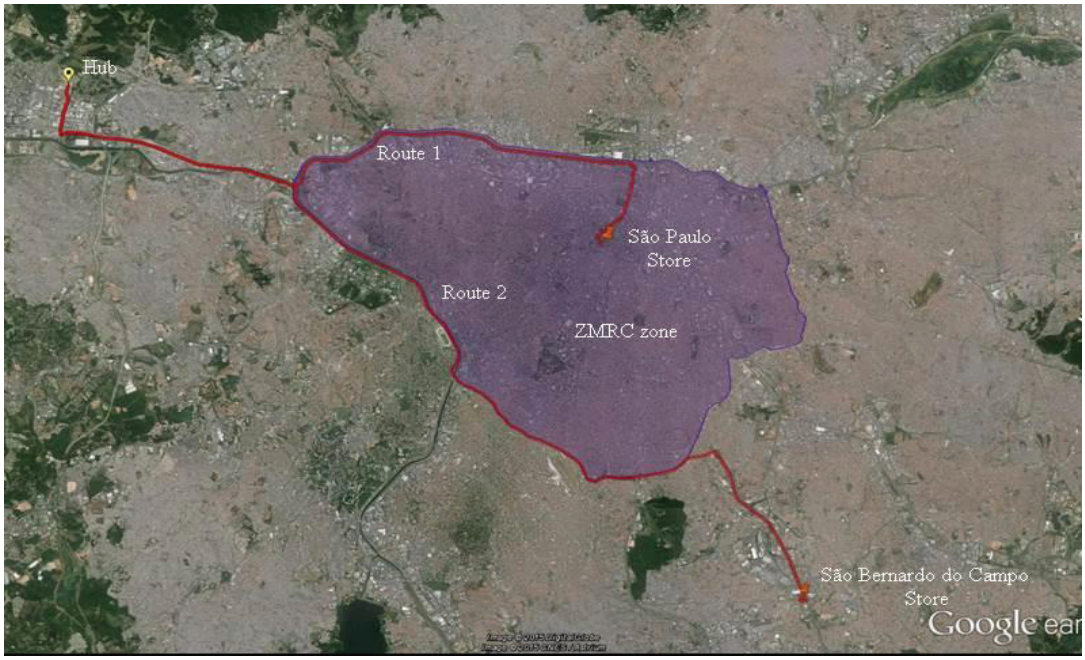

Fig. 2. Location of the pilot project

Fig. 2 above shows the location of the cross-docking hub, the selected stores and the routes that are used to access each store – both located within the ZMRC. One of the stores is located in Vale do Anhangabaú just 300 meters from the official FIFA FAN FEST location that featured games projected on large screens and musical performances. These events gathered large crowds and blocked vehicle access, affecting the supply of goods in the region (Fig. 3).

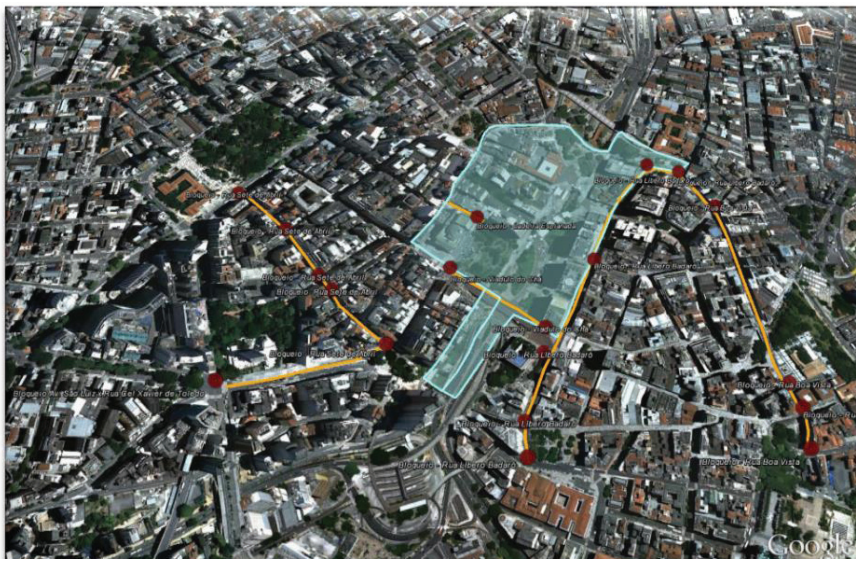

Fig. 3. Area and streets with blocked access in Vale do Anhangabaú during the World Cup

Both stores are open from 10:00 am to 9:00 pm Monday through Saturday. Hand trucks for store unloading and delivery are allowed until 10:00 am. The store staff does not receive deliveries from 10:00 am through 3:00 pm due to the increased customer footfall. At the São Paulo store, truck access to the internal parking lot is not permitted during mall operating hours, and unloading takes place on the street. The mall access door has no ramp and a small staircase (Fig. 4a and 4c). However, at night, access by small vehicles is allowed – providing direct access to the freight elevator and improving both security conditions and cargo handling. At the São Bernardo do Campo mall, access to the internal parking lot and dock is allowed for both day and night operations – no changes in security conditions were identified.

In an interview, the security guards stated that during the daytime, thefts from parked cargo trucks while the drivers deliver goods to stores are common because there is no security staff in the area outside the mall.

Fig. 4. Daytime Deliveries vs Off-hour Deliveries at the São Paulo shopping mall

At the São Paulo mall store, goods are received through the stock entrance, where the products are processed upon receipt. The processing of products is illustrated in Fig. 5.

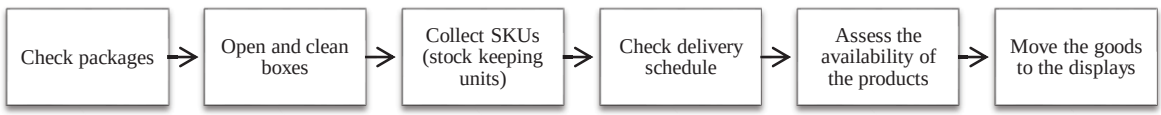

Fig. 5. Processing of merchandise in the store

Goods are processed while the stores are open to customers, and the staff replenishing the stock divide their time between stocking store shelves and attending to clients.

To plan the pilot project and define the type of off-hour delivery, meetings were conducted with delivery stakeholders. There was no third shift in either store, and the unassisted delivery option was rejected for the following reasons: (1) driver access to the stores creates security concerns (risk of cargo theft); (2) shopping malls do not have a specific area for unassisted deliveries; (3) developing an unassisted receiving structure creates additional costs; (4) the receiving area or structure demands a large capacity; and (5) the freight cost reduction does not outweigh the additional cost of unassisted delivery. The pilot-tested solution was staffed off-hour deliveries. Two employees worked additional hours to wait for shipments, adding night pay costs for the receiver. The pilot project started on June 3rd, and seven deliveries were made: two to the São Bernardo shopping mall one week before the World Cup started and five to the São Paulo shopping mall during the World Cup period.

During the pilot, all deliveries were transferred to off-hours and scheduled for 10:00 p.m. at both stores. Despite variations in travel time and some minor delays, transit time to the delivery locations was much shorter than during the daytime. Unloading also took less time compared with daytime delivery because there were no difficulties in accessing the location or processing the packages in the mall.

Travel time varied from 23 minutes (June 20) to 45 minutes (June 11). The team noticed that before 10:00 pm traffic conditions were still unstable on the routes travelled, and travel time varied significantly. After this period, there was no traffic on the route. The delivery departure and arrival times are shown in Table 1. Table 2 provides a general comparison between the two stores. As observed, traffic jams resulted in a considerable reduction of average vehicle speed and efficiency. According to CET (2014), the average speed in the city of São Paulo during peak hours (from 7:00 am to 10:00 am) was 21 km/h in 2013. The average speed in São Paulo fast transit lanes was 52 km/h during morning peak hours. As observed in the pilot, the average speed at night was 60 km/h, 200% higher than the average daytime speed.

Table 1. Schedule of arrivals and departures during the pilot program in São Paulo

	6/9/2014	6/10/2014	6/11/2014	6/16/2014	6/18/2014	6/20/2014
Depart hub	8:58 p.m.	8:28 p.m.	9:00 p.m.	8:58 p.m.	9:35 p.m.	10:25 p.m.
Arrive at store	9:33 p.m.	8:55 p.m.	9:45 p.m.	9:30 p.m.	10:08 p.m.	10:48 p.m.

At these times, no conditions (such as congestion) were identified that would impede the movement of vehicles on the route because the roads had freely moving traffic. During delivery, noise may be generated when the vehicle enters the parking lot and maneuvers to park, when the merchandise is unloaded, and when departing the site. During the pilot program, no conditions were observed that would create noise or nuisance for the local population.

In the operations of the São Bernardo do Campo store (located in Shopping Extra Anchieta), off-hour transit time was also identified as an advantage because the route to reach the store utilizes roads within the ZMRC, which experience traffic congestion during the day. The team observed that during the first delivery, the travel time to the store was much longer than the return trip (a difference of 30 minutes); the trip began at 8:00 p.m., coinciding with the end of the vehicle restriction period. On the second day, no significant difference was observed between the travel time to the store and the return trip (only 9 minutes). On this second day, the trip began at 9:00 p.m.

The São Bernardo do Campo store has internal parking and adequate docks that require identification of both vehicle and driver to permit deliveries. No security risks to the merchandise were observed because the internal parking area is guarded by mall security staff. Security concerns do not differ by time of day because entry to the docks must be cleared by the mall security team.

Shopping Extra Anchieta store, unlike the Shopping Light store (located in São Paulo), does not have a dedicated service corridor/door to the storage area – just one access site through the main door. Some of the store's displays must be shifted to move the hand truck to the storage area. Considering these restrictions, it is preferable to receive deliveries before the store opens at 10:00 am or during the night. Because transit times are not reliable during the day, delivering at night is an effective alternative.

One pilot concern was possible effects on the local community from night operations, but no noise conditions were identified at either shopping mall and there were no residents nearby. Both establishments are located in a

restricted commercial zone where industrial activities are permitted. Table 2 below shows a general comparison between the stores.

Table 2. Comparison between the stores during the pilot program

Characteristcs	São Paulo		São Bernardo do Campo	
	Day	Night	Day	Night
Unloading area	Side street	Internal parking area	Internal docks	Internal docks
Noise disturbances	Not observed	Not observed	Not observed	Not observed
Accessibility	Stairs and elevator	Elevator	Level	Level
Delivery location	Internal stock area, back of store		Internal stock area, inside store	
Average volume/week	100 m3		144 m3	
Average frequency/week	3	3	3	3
Delivery model	Shared LTL	Dedicated	Shared LTL	Dedicated

5. Conclusion

According to the logistics company, corroborating studies such as Holguin-Veras *et al.* (2012) and Holguín-Veras *et al.* (2013), it was possible to observe in the business case an increased productivity in deliveries due to reduced travel time and reduced unloading times. Although larger vehicles were not used during the pilot project, it is possible to use fewer vehicles to meet demand during nighttime deliveries. Thus, the logistics operator considered night deliveries an effective option for ensuring deliveries in major urban centers where roads may be blocked (by people, road conditions or events). No noise or disturbance to the local population was observed in conjunction with deliveries. The sporting goods company manages six stores located in malls in the São Paulo metropolitan area, and nearly 70 deliveries per month are made to these six stores alone. In other words, these 70 trips are made during peak daytime hours and could be transferred to off-hours using fewer vehicles, reducing pollutant emissions and improving urban mobility. For the logistics provider, the new scenario is an opportunity for freight cost reduction. It also creates an opportunity to establish a gain-sharing contract between the logistics provider and its customer.

If a project to combine shipments were implemented at all six stores, the solution would differ from the one adopted here. To guarantee higher productivity, the vehicle would have to travel at dawn to make the six deliveries. The receiving staff at each store would have to wait for the shipment arrival – which could happen between 10:00 pm and 6:00 am. Consequently, additional hiring would be necessary, incurring even higher labor costs. In this case, one possible solution to maintain staffed off-hour deliveries is to assign an employee to travel with the driver to provide an itinerant receiving service. This employee function is to open the store to guarantee its security and to sign-off on the delivery receipt. Because of some security concerns, the employee should be a trustworthy person hired by the retail company.

Staffed delivery using an itinerant receiving service would work well under two circumstances: (1) numerous deliveries and stores, allowing high vehicle productivity; and (2) stores managed by the same company because the itinerant employee would be hired by them. Vehicle productivity must be optimal to reduce freight costs and outweigh the incremental costs of labor.

The major result of this pilot project was improved understanding of the different factors that impact the design of off-hours delivery solutions. The best scenario is one that generates higher productivity for all stakeholders involved – vehicle, driver and receiving staff – and clear benefits, such as traffic and environmental impact reduction.

The logistics company noted that collaborative planning for off-hour deliveries involving customers and carriers enhances the partnership between those organizations, creating opportunities to consolidate cargo and improve the delivery system and quality of service. For recipients of deliveries, we observe an additional opportunity to improve inventory and workload for each store, i.e., reducing the quantity of deliveries while increasing delivery frequency, improving the receiver's ability to process the products.

During the project, receivers identified some problems that occurred during deliveries, such as delays in arrival time, order divergences, difficulties guaranteeing access of drivers at the malls and receiving logistics operator's

information about the time of arrivals and orders. Receivers consider off-hour deliveries a good practice that could be converted into a long- term project, as long as problems are resolved.

To enable off-hour deliveries, it is necessary to identify and synchronize all players involved in the process, which, in the case of the mall stores, were the logistics provider, carrier, customer, receiving store, mall management and mall security, and even small stakeholders, such as parking administration.

Positive aspects for the receivers included delivery and lead time reliability; improved quality of customer service because retailers have less interruptions during open hours; reduced time needed to place goods on displays, as there is no overlap between customer service and in-store product allocation; improved use of stockroom space because stock staff have more time to organize and process goods without interference from the sales staff; and ability to increase delivery frequency given the ease of access. However, despite all these positive results, the economic outcome should be sufficiently appealing for the receiver to sustain the project.

To guarantee vehicle productivity, this business model depends on a sufficient number of delivery points. This productivity must be translated into freight cost reductions to enable off-hour operations. Moreover, to achieve a high productivity level, load characteristics and vehicle type must be considered.

In addition to the findings presented on the costs associated with receiving deliveries (labor costs) and receiving structure, the following factors must be analyzed to assess the viability of night operations: vulnerable situations and noise emissions during unloading, proximity to the local community, structure of the unloading area (dock, offloading space, internal and closed parking areas), and potential areas and routes where theft may occur or security and monitoring systems may be evaded. Although no noise-related disturbances were observed during the pilot project at the two stores, it is necessary to analyze the receiving structure at the other shopping malls.

It should be noted that for the project to work properly, it is essential that the operation complies with delivery schedules and that delivery times are scheduled so that store employees do not spend time waiting for the truck to arrive to avoid generating non-productive labor costs.

Thus, the aim of this study was to identify the operational and financial factors that impact off-hour delivery solutions for urban centers, considering the additional factor of large-scale events that influence distribution operations, in this case, the 2014 FIFA World Cup. The logistics company is now further developing the night delivery model in its Brazilian operations.

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